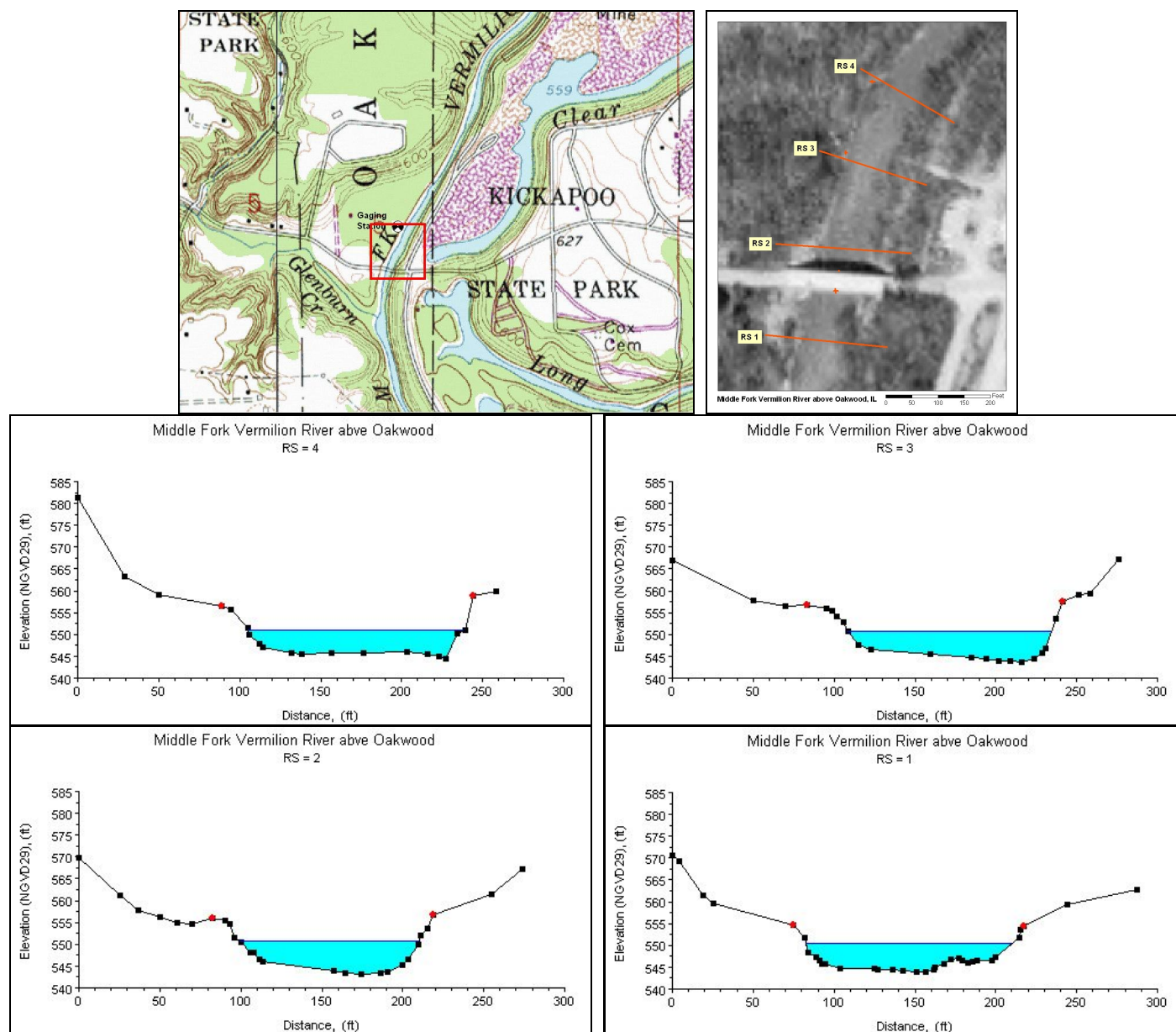# Middle Fork Vermilion River Above Oakwood, IL

Study Reach.--The channel reach under consideration is natural. A study reach, approximately 400 ft long, is selected upstream of the Kickapoo State Park Road bridge, as shown in the quadrangle map on the top left. The reach starts from 100 ft downstream of the Kickapoo State Park Road bridge and extends approximately 300 ft upstream. There are four surveyed cross sections (surveyed by the U.S. Geological Survey in May 2003) available for describing channel geometries in the study reach (see plots above). The channel alignment, approximate variations in channel width and bank conditions, and locations of the cross sections are shown in the aerial photo on the top right. Cross-sectional geometries vary gradually from upstream to downstream.

Gage Location.--Lat 40°08'14", long 87°44'45", in NE1/4 SW1/4, sec.5, T.19N., R.12W., Vermilion County, Hydrologic Unit 05120109, on right bank 150 ft upstream from Kickapoo State Park Road bridge, 1.0 mi upstream from Interstate Hwy 74 bridge, 2.0 mi northeast of Oakwood, and at river mi 31.7. The USGS streamgage-station number is 03336645.
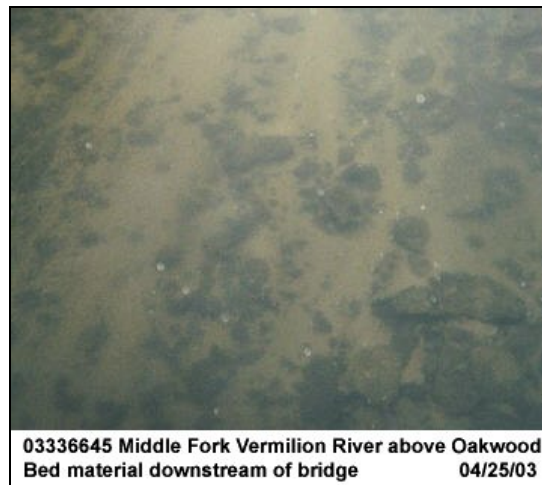
Drainage Area.--432 sq mi.

Gage Datum and Elevations of Reference Points.--Datum of gage is 544.42 ft; staff gage 1 is located 300 ft upstream from the bridge on the right bank, elevation of brass screw = 549.664 ft; staff gage 2 is located 150 ft upstream from the bridge on the right bank, elevation of brass screw = 549.446 ft; reference point for n-value study RP-N1 is the top of the nut on the concrete anchor on the upstream side of the bridge at midchannel near station 90, elevation = 570.508 ft; a wire-weight gage (WWG) is attached to the downstream face of the Park Road bridge. All elevations are in NGVD 1929 convention.

Stage, Discharge Measurements, and Computed n-Values.--Water-surface elevations were read from the two staff gages at the upstream portion of the study reach, RP-N1 on the upstream side of the bridge and the WWG before, during, and after each discharge measurement. Stage readings from the gage house also were referenced for checking the readings. Discharge measurements were made using the conventional current-meter method. The computed n-values are listed in the following table. Whenever possible, the computed n-values are associated with a photo taken at the time of the measurement. The photos are arranged from low stage to high stage in order to illustrate contributing factors of n-values at a particular stage.

Date of Observation	Discharge (ft³/s)	Average Cross Section Area (ft²)	Hydraulic Radius (ft)	Mean Velocity (ft/s)	Slope	Coefficient of Roughness n
4/25/2003	148.0	135.5	1.56	1.13	0.002240	0.025
5/15/2003	565.0	233.1	2.29	2.45	0.000560	0.023
6/12/2003	3070.0	626.4	4.98	4.91	0.000769	0.033
3/29/2004	3380.0	667.0	5.25	5.08	0.000769	0.031

0333645 Middle Fork Vermilion River above Oakwood, IL   08/18/04
Low flow, looking Upstream

03336645 Middle Fork Vermilion River above Oakwood, IL   04/25/03
Looking Downstream from gage

03336645 Middle Fork Vermilion River above Oakwood, IL
Looking Downstream from bridge
05/15/03
n = 0.023

03336645 Middle Fork Vermillion River above Oakwood, IL
Looking Upstream from bridge
05/15/03
n = 0.023

03336645 Middle Fork Vermilion River above Oakwood, IL
Looking Downstream from bridge
06/12/03
n = 0.033

03336645 Middle Fork Vermilion River above Oakwood, IL
Looking Upstream from bridge
06/12/03
n = 0.033

03336645 Middle Fork Vermilion River above Oakwood, IL
Looking Downstream from bridge
03/29/04

03336645 Middle Fork Vermilion River above Oakwood, IL
Looking Upstream from bridge
03/29/04

03336645 Middle Fork Vermilion River above Oakwood
Bed material downstream of bridge   04/25/03

Description of Channel.--This channel is natural. The streambed consists primarily of sand-gravel-cobble mixtures from the upstream end to downstream of staff gage 2 and RP-N1. Downstream from RP-N1, the study reach consists of bedrock and scattered boulders to the end of the reach. The bottom width of the channel varies between 100 and 120 ft. The channel is trapezoidal and subject to debris accumulation at the bridge on the right side of the channel. The banks are about 13 ft in height and have a top width between 135 and 160 ft. Banks are steep with alluvial sand deposits at toe, slightly eroded surface, and patches of bushes and tall trees on top of the bank. The study reach is fairly straight.

Floods.--Maximum discharge, 15,500 ft^3/s, Apr. 13, 1994, gage height, 20.46 ft.

Estimated n-Values using Cowan s Approach.--0.031 ~ 0.046